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COMMITTEE ON THE PEACEFUL USES OF OUTER SPACE

IMPLEMENTATION OF THE RECOMMENDATIONS OF THE SECOND UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

International cooperation in the peaceful uses of outer space: activities of Member States

Note by the Secretariat

Addendum

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* This document has not been formally edited.

INTRODUCTION

1. In accordance with a recommendation of the Committee on the Peaceful Uses of Outer Space at its thirty-seventh session, Member States have submitted information on the following topics:¹

(a) Those space activities that were or could be the subject of greater international cooperation, with particular emphasis on the needs of the developing countries;

(b) Spin-off benefits of space activities.

2. The information on those topics submitted by Member States as of 30 November 1994 is contained in document A/AC.105/592; the information submitted between 1 and 31 December 1994 is contained in document A/AC.105/592/Add.1; the information submitted between 1 and 27 January 1995 is contained in document A/AC.105/592/Add.2; the information submitted between 28 January and 6 February 1995 is contained in document A/AC.105/592/Add.3; the information submitted between 7 to 10 February 1995 is contained in document A/AC.105/592/Add.4 and the information submitted between 11 February and 23 March 1995 is contained in document A/AC.105/592/Add.5.

3. The present document contains information on those topics submitted by Member States between 24 March and 15 June 1995.

¹Official Records of the General Assembly, Forty-ninth Session, Supplement No. 20 (A/49/20), para. 29.

REPLIES RECEIVED FROM MEMBER STATES

EGYPT

[Original: English]

In 1975, a cooperative programme was undertaken by the Helwan Institute of Astronomy and Geophysics (HIAG), the Technical University of Prague (Czech Republic), the former Soviet Academy of Sciences and the Smithsonian Astrophysical Observatory (SAO) (United States), to set up a satellite laser ranging station at the observatory in Helwan (Egypt). The laser, the mount, and much of the electronics were furnished by the Czech specialists and SAO provided the station clock and funds for equipment purchase and operations from the United States excess currency programme. The Egyptians provided the site, local manpower, local services and support, and local data analysis and data evaluation. The Czech Republic and the former Soviet Union provided technical expertise and on-site support.

The site was operated for several months per year in support of global tracking requirements. The data were provided to American computational centres at SAO, the National Aeronautical and Space Administration's (NASA) Goddard Space Flight Centre, and the University of Texas, where it was processed and made available to investigators in the NASA Crustal Dynamic Programme and its predecessors. The original laser system at Helwan was a first generation instrument that had an accuracy of 1-2 meters on lower orbiting satellites. Through the years, by the efforts of the Czech and Egyptian specialists, the system was provided with a new mount, laser transmitter, electronics and detector. With the evolution of capability, the instrument is now routinely ranging to satellites with laser reflectors with a single-shot precision of a few centimeters.

In 1987, the laser station supported the crustal dynamics and Wegener programmes on a reimbursable basis, providing data on approximately 75 satellite passes during the period of June-September. The data were furnished for evaluation to the University of Texas which determined the system performance. In addition, calibration and system performance verification tests indicate that the overall accuracy is in the range of 1-3 centimeters. From 1989 to 1993, the station was again operated on a reimbursable basis for several months providing full data sets on laser satellites. A large amount of data on lower orbiting satellites over the period were obtained. The quality and quantity has continually improved to the point where the Helwan facility is now one of the fundamental stations in the global network. In 1993, the station acquired a total of 69 passes on Lageos-1, 186 passes on Lageos-2, 103 passes on Topex, 82 passes on Starlette, 127 passes on Ajisai and 88 passes on Mir-1. The operations were extended over a period of six months with the European Space Agency (ESA) also providing partial support.

The HIAG operate the station for regular tracking of the required satellites on their night-time passes, performs all the necessary calibration and performance evaluation measurements of the laser ranging system and makes resulting data available to the international community. Both quick-look normal-point data and full-rate data are forwarded to the European Data Centre in Munich (Germany) in standard format on a weekly basis.

The technical activities at Helwan station is under the direction of Professor M. Y. Tawadrous, head of Space Science Researches Department, National Research Institute of Astronomy and Geophysics (NRIAG).

The laser tracking system of the Helwan Satellite Ranging Station consists of:

- A two-axial mount provided with a mechanical gearing system and control optical devices;
- A laser transmitter with the necessary power supply and cooling equipment;
- A photoelectric receiver;
- A ranging electronics system;
- A global positioning system (GPS) time base; and
- A computer with a highly advanced hardware and software package for carrying out blind ranging observations of the artificial satellites in Earth shadow or daylight.

The scientists in the Space Science Department use these observations for many researches in the field of space sciences, such as:

- Studying the effect of the Earth's magnetic field on the motion of the artificial Earth satellites;
- Studying the gravity field of the Earth from the motion of artificial Earth satellites;
- Use of artificial Earth satellites for studying the figure of the Earth and for other geodetic applications;
- Studying the tectonic motion using Lageos-1 and Lageos-2 data;
- Studying the forces acting on artificial Earth satellites; and
- Participation in many international programmes such as SPIN, ATMOSPHERE, MERIT, WEGENER/MEDLAS.